Trade, conflicts and political integration: explaining the heterogeneity of regional trade agreements

Vincent Vicard

Documents de Travail du
Centre d'Economie de la Sorbonne

CES Working Papers

Trade, Conflicts and Political Integration : Explaining the Heterogeneity of Regional Trade Agreements

Vincent VICARD

2008.22

CENTRE NATIONAL
DE LA RECHERCHE
SCIENTIFIQUE

Maison des Sciences Économiques, 106-112 boulevard de L'Hôpital, 75647 Paris Cedex 13
http://ces.univ-paris1.fr/cesdp/CES-docs.htm
ISSN : 1955-611X

Trade, Conflicts, and Political Integration: Explaining the Heterogeneity of Regional Trade Agreements*

Vincent Vicard†
Paris School of Economics
University Paris I Panthéon-Sorbonne

March 2008

Abstract: This paper investigates the determinants of the shape of regional trade agreements (RTAs). Because the world is constituted by independent political entities, international trade flows take place in a system where property rights are unsecured and RTAs should be understood as regulation mechanisms. In this theoretical framework, trade and security issues interact in the formation of RTAs, so that their determinants differ according to their level of political integration, defined by their ability to promote the negotiated settlement of conflicts. Empirical results confirm that countries more subject to interstate disputes and naturally more opened to trade are more likely to create politically integrated regional agreements, such as common markets or custom unions. On the contrary, international insecurity deters less integrated agreements implying a weak institutional framework, such as preferential or free trade agreements.

Keywords: International Conflicts, Political Integration, Regionalism, Trade, War.

Résumé: Cet article étudie les déterminants de la forme des accords commerciaux régionaux. Etant donn que le monde est constitué d'entités politiques indépendantes, les échanges internationaux se déroulent dans un système international où les droits de propriété sont imparfaitement protégés ; les accords commerciaux régionaux peuvent alors être compris comme des mécanismes de régulation des relations interétatiques. Dans ce cadre théorique, les questions de sécurité et de commerce interagissent dans les décisions de politique commerciale, et il est possible de montrer que les déterminants de la formation des accords commerciaux régionaux diffèrent selon leur niveau d'intégration politique ou institutionnelle, définie par leur capacité empêcher les conflits internationaux de dégénérer en guerre. Les résultats empiriques confirment que les paires de pays ayant plus de conflits interétatiques et naturellement plus ouverts au commerce international sont plus enclines créer des accords commerciaux intégrés (unions douanières ou marchés communs). A l'inverse, l'insécurité internationale réduit la probabilité pour deux pays de créer des accords commerciaux comportant une structure institutionnelle limitée, comme les accords préférentiels et les zones de libre échange.

Mots clés : Conflits Internationaux, Intégration Politique, Régionalisation, Commerce International, Guerre.
JEL classification: D74, F15, F51, F52, H56

*I thank Thierry Mayer for providing data and helpful suggestions. I also thank Antoine Berthou and Julien Vauday. A previous version of the paper, entitled "Trade, War, and Political Integration: the Regional Interplays", benefited from comments at the CESIFO Venice Summer Institute (2006), the SMYE in Seville (2006), the EEA annual meeting in Vienna (2006), and the trade seminar at University Paris I Panthéon-Sorbonne (2007). I gratefully acknowledge the financial support from ANR.

†Address: Centre d'Economie de la Sorbonne, 106-112, Bd de l'Hôpital, 75647 Paris Cédex 13, France. Tel and Fax numbers: (0033) 144 078 211/247. E-mail: vincent.vicard@malix.univ-paris1.fr.

I Introduction

Regional trade agreements (RTAs) are an increasingly important feature of the international trading system - as of September 2006, 156 RTAs notified to the WTO under Enabling Clause and GATT Art. XXIV were in force. Their shape however greatly differs throughout the world. They range from the simple exchange of preferences on a limited number of products to the elimination of almost all tariff barriers and, beyond, the harmonization of standards and rules on services, intellectual property rights and competition. Existing literature provides no theory to explain these differences. The usual classification, derived from Balassa (1961), sorts RTAs from the least integrated to the more integrated, as a step by step approach to economic union, through free trade area, customs union and common market. The implicit assumption behind is that more integrated arrangements provide a deeper trade integration.[1] Empirical evidence of a larger effect of more integrated RTAs on intra-regional trade are however lacking (Ghosh and Yamarik, 2004; Vicard, 2007), as are historical illustrations of gradual regional integration processes - custom unions are mostly created directly as such whereas free trade agreements almost never evolve into custom unions (CU). Out of the 18 customs unions created worldwide since 1948, 14 have been created directly as such, without any intermediate step such as a preferential arrangement (PA) or a free trade agreement (FTA). It suggests that determinants of the shape of RTAs have to be found elsewhere. This paper addresses the question of the endogenous formation of RTAs and investigates the determinants of their shape.

In this respect, an important and rather ignored facet of regionalism is the security issue.[2] In an international system where no institution or third party can enforce property rights at the supranational level, gains from trade may be damaged because of interstate conflicts. Since interstate disputes occur under the threat of military force, and can thus lead to the disruption of trade (Glick and Taylor, 2005; Martin et al., 2008), the shadow of conflict may have a significant influence on the design of international economic policies. Specialization and greater dependence on trade involve risks; trade and security issues are thus intertwined and their interplays should shape the decision of creating a RTA. The demand for an insurance mechanism, securing the continuity of trade relationships in the future, should therefore increase with the level of trade integration.

Regional economic integration is likely to promote the peaceful resolution of disputes through two main channels. By favoring intra-regional trade over extra-regional trade,

[1] In his seminal paper, Balassa (1961) however also mentions social integration, but he dismisses this second criteria.

[2] Historically, several regional integration processes, such as the European Union - the preamble to the Paris Treaty of 1951 establishing the European Coal and Steel Community "*resolved to substitute for age-old rivalries the merging of their essential interest; to create, by establishing an economic community, the basis for a broader and deeper community among peoples long divided by bloody conflicts.*" -, and the MERCOSUR explicitly refer to security concerns (World Bank, 2000).

RTAs increase the opportunity cost of war (Martin et al., 2008; Oneal and Russett, 1997, 1999; Barbieri, 2002) and thus promote the negotiated settlements of conflicts. On the other hand, the creation of supranational institutions to negotiate and implement common rules favors the exchange of information on military capabilities and resolve in conflicts, and strengthens trust among political leaders, thus favoring commitment and the peaceful resolution of interstate disputes (Bearce, 2003; Bearce and Omori, 2005; Haftel, 2007). Though, the regional institutional frameworks created along regional integration greatly differ according to the kind of RTAs; only the more integrated RTAs, such as customs unions and common markets, require a significant common institutional framework likely to promote negotiated settlement of disputes. Accordingly, the depth of a regional agreement can be defined in relation with the level of political/institutional integration it entails. Adopting a broad definition of international organizations, including the regulation of interstate relations, and defining RTAs by their ability to manage interstate disputes allow to understand why the shape of RTAs differs around the world.

The decision to form a RTA is investigated both theoretically and empirically. I build on the recent political economy literature on political (dis)integration (Alesina and Spolaore, 2003)[3] and develop a model of RTA formation in the shadow of conflicts. Then, I show how, in this framework, differentiating RTAs by their ability to foster the peaceful resolution of interstate disputes, i.e. the depth of institutional integration, leads to different determinants in the choice to create a RTA. In my framework, economic and political boundaries are not inevitably similar: governments can decide to enlarge their market size, by forming a RTA, whereas the defence policy remains at the national level. Trade and security issues are thus simultaneously introduced in a model of political integration. Conditions under which regionalism endogenously takes place for given level of trade openness and interstate insecurity are derived. I find that countries will accept to depend more on a partner only if the trade related gains from integration are not offset by larger potential costs related to an increased dependency on a given trading partner under RTA. The effect of international insecurity and globalization on gains from the creation of a RTA are thus found to depend on the impact of RTAs on dispute escalation to war probabilities. So, in that framework, RTAs can be differentiated according to their ability to reduce the likelihood of interstate dispute escalation to war, i.e. according to the level of political or institutional integration they entail.

This theoretical model provides us with a framework to conduct the empirical analysis of the determinants of the shape of RTAs. A preliminary step of the empirical analysis is to distinguish the different kind of RTAs. I first investigate the hypothesis that the

[3]It shows how, because large countries benefit from a market size advantage (Alesina et al., 2000) or a scale advantage in defence (Alesina and Spolaore, 2006), international trade openness or international insecurity determine the number and size of countries.

effect of RTA membership on the likelihood of dispute escalation to war differs according to the depth of integration. Only customs unions and common markets are found to foster the peaceful resolution of interstate disputes; these kinds of RTAs are then regarded as deep agreements, whereas preferential arrangements or free trade agreements are shallow agreements. I then investigate the determinants of the formation of different kinds of RTAs on a large dataset covering 87 countries over the 1970-2000 period. I use events data to assess the occurrence of interstate disputes, and address endogeneity issues related to past membership to RTAs using instrumental variables. Two implications of the model are confirmed empirically: (i) countries undergoing many interstate disputes create deeply integrated RTAs, such as custom union or common market, whereas the opposite is true concerning shallow agreements ; (ii) globalization, through a reduction in physical barriers to trade, promotes more the creation of deep RTAs than shallow RTAs.

Based on a theoretical model of endogenous formation of RTAs, this paper thus provides empirical evidence that the determinants of RTA creation between two countries differ according to the kind of RTA that is created. To the best of my knowledge, it is the first assessment of the determinants of the shape of RTAs. Besides their effect on tariffs, my model explicitly emphasizes the role of RTAs as a regulating mechanism for interstate relations. The approach of RTAs developed in this paper relates to the studies of the institutional design of international trade agreements (Bagwell and Staiger, 2002), which emphasizes in particular that RTAs can be regarded as commitment devices and solve a time-consistency problem vis-a-vis the domestic private sector (Maggi and Rodriguez-Clare, 1998; Mitra, 2002) or a terms-of-trade-driven prisoners' dilemma (Ornelas, 2005). Here, depending on their shape, RTAs can work as a means for governments to insure against armed conflicts and the disruption of trade in the future. The absence of such an insurance mechanism would thus create security risks for pairs of countries undergoing many interstates disputes, and question their openness to trade. As a regulation mechanism, regionalism would be a complement to multilateralism.

The remainder of the paper is constructed as follows. The next section presents regional trade integration in light of the theory of war. In section 3, I develop the theoretical model of regional integration in an insecure international system and derive endogenously conditions under which regional integration will take place. Section 4 presents data and econometric results related to the effect of RTAs on war and the determinants of each kind of RTA.

II Regional trade integration and the theory of war

Based on historical examples, World Bank (2000) underlines that the shape of integration matter regarding its effect on regional security. The European Union or the MERCOSUR

are prominent illustrations of security enhancing RTAs, whereas examples of regional integration processes triggering intra-regional conflicts include the CACM, with the outbreak of an armed conflict between Honduras and El Salvador in 1969, or the East African Common Market, which enhanced conflicts between Uganda, Tanzania and Kenya and led to give up the common market agenda, close borders and the seizure of Community assets in 1978. The reasoning explaining these alternative effects of trade integration on war probabilities rests on the fact that, while creating gains, trade also creates winners and losers. For instance, the agglomeration of industries in one country can be detrimental to another country or region, thus increasing interstate disputes. Any policy aiming at increasing international integration is nevertheless likely to raise dispute issues; the question is then to understand what drives the choice to settle disputes through negotiation rather than war and how international institutions could affect these mechanisms.

As far as destructions are involved, the use of armed force to resolve disputes is a second best outcome and is always Pareto dominated by a negotiated settlement. A rationalist explanation of war states that wars occur because state leaders are unable to reach *ex ante* a mutually advantageous arrangement on conflict issues.[4] The question is then to understand what prevents leaders to find and/or implement a bargaining solution to resolve their disputes. Only three arguments fit a rationalist definition of war (Fearon, 1995): asymmetries of information on resolve or military capabilities with incentives to misrepresent them (see Levy and Razin (2004) for a formal model), commitment problems, and issue indivisibility. Accordingly, Grossman (2004a) develops a formal model of peace and war in territorial disputes with complete information, which highlights the importance of divisibility of the outcome of the dispute, the effectiveness of fortifications and counter-attack (or first-striker advantage) and on the permanence of the outcome of a potential war.[5]

Based on these rationalist explanations of war, Bearce (2003) identifies three channels through which RTAs could facilitate the peaceful resolution of conflicts and prevent disputes to spillover into war. The first one is related to an opportunity cost analysis: because regional trade integration increases gains from trade and war disrupts bilateral trade (Martin et al., 2008; Glick and Taylor, 2005), the opportunity cost of war between members is larger. It would thus encourages governments to consider peaceful bargains instead of war. Second, RTAs create supranational institutions aiming at managing conflicts, such as dispute settlement mechanisms for instance. These institutions avoid the

[4]The rationalist view of war is widely developed by political scientist as well as economists. Two alternative theories of war exist. One explains war occurrence by the irrationality of state leaders; the second assumes that leaders may benefit from war without suffering the costs whose load rests on soldiers or citizens. See Jackson and Massimo (2007) for a model explaining war occurrence as an agency problem in a principal-agent framework, despite the existence of complete information about winning probabilities and the availability of bargaining possibilities through transfer paiement.

[5]Grossman (2004b) documents historical examples illustrating the previous model.

politization of disputes, thus limiting the opportunity to use armed force in the event of conflict. Disputes on economic issues are nevertheless generally not likely to spillover into war. Yet, international institutions are also an important mechanism of collection and diffusion of information. Institutions created along regional integration processes promote the exchange of information on and between member states on a wide range of issues, on trade but also on security and military issues. Indeed, some RTAs include formal security/military substructures and/or cooperation through joint military exercises and defence minister forums. These are likely to reveal information on military capabilities as well as opponent's resolve and patience in disputes so as to reduce asymmetries of information and to favor the identification and the negotiation of mutually beneficial solutions. The exchange of information on military capabilities also reduces the opportunities for surprise attacks. Third, negotiation cannot prevails if any agreement reached cannot be credibly enforced, which is often the case in an international system where no third party or supranational institution is able to enforce property rights (Grossman, 2004b).[6] By creating rooms for discussion and negotiations, regular meetings of head of states and high level officials, or the existence of an executive secretariat, promote the creation of trust between political leaders and mitigate the problem of credible commitment in interstate negotiations. By promoting the early settlement of disputes and the peaceful resolution of conflicts, institutions created along with regional trade integration are likely to provide a positive externality in terms of national security and to reduce the risk war (Bearce and Omori, 2005; Haftel, 2007).

Regional integration not only provides trade preferences, but also works as a regulating mechanism for economic and more broadly interstate relations. As underlined by Anderson and van Wincoop (2004), economic integration has more to do with domestic policies (regulation, norms, property rights, infrastructures...) than direct trade policy instruments (tariffs, quotas...).[7] The harmonization and implementation of such policies at the regional level require the creation of common institutions and, possibly, the provision of public goods at the regional level. It thus entails some degree of supranationalism, limiting state sovereignty. Though, the institutional framework and its degree of supranationalism greatly differ according to the kind of RTA. Creating a custom union requires to agree on a common external tariff and revenue distribution between state members. A common market (CM) requires more complete political institutions to agree on a broader set of issues (harmonization of regulation and standards, free movement of goods and factors,...)[8], whereas a free trade agreement or a preferential arrangement involve a weak

[6] Jackson and Massimo (2007) also show, in a setting where countries fight because of political biases of their leaders, that when state leaders lack the ability to credibly commit to a negotiated deal, the range for negotiated settlement of disputes is reduced.

[7] They argue that, out of an overall border barrier of 44%, tariffs and non-tariffs barriers to trade represent only 8%.

[8] See, for instance, Alesina and Wacziarg (1999) for a detailed mapping of policy areas carried out at

institutional framework and a limited political integration.[9] According to this political integration criteria, two categories of RTAs can be distinguished: customs unions and common markets on the one hand, and preferential arrangements and free trade agreements on the other. Only the former implies the creation of a significant institutional framework likely to provide a security externality, by favoring the peaceful resolution of conflicts and reducing probabilities of dispute escalation to war. The latter involves no or few political or institutional integration.

III A model of regional integration in the shadow of conflict

The literature on political integration focuses on the question of country formation by citizens in regions. Instead, we are interested here in the formation of regional trade agreements by independent countries, i.e. how states can share common economic boundaries while retaining independent political boundaries (defence policy). Indeed, the argument provided by Alesina et al. (2000) of a trade-off between gains from large market size and heterogeneity costs of political integration is also relevant when countries create a RTA, i.e. a regional market. On the other hand, defence policy remains a national prerogative. I embed a conflict game and a simple model of trade in a political integration framework, to derive the effect of both trade and security issues on the endogenous formation of RTAs. Discriminating economic and political integration then allow to highlight the determinants of different kinds of RTAs.

1 The basic setting

I build on the framework developed by Alesina and Spolaore (2005) to construct a model of regional integration, in which a discrete number of countries interact in an insecure world. Governments have to choose their defence capabilities and whether or not to enter a RTA, given that:

- entering a RTA means the removal of restrictions to trade with other members and thus provides productivity gains for the population, but entails heterogeneity costs;
- countries face interstate disputes over resources or production, and those are resolved either peacefully or through war;
- war disrupts trade with the opponent.

the EU level, and Bouzas and Soltz (2000) concerning the institutional framework of MERCOSUR.

[9] The ASEAN free trade agreement provides an illustrative example, with weak regional institutions in order to limit any supranationalism (Best, 2005). Pomfret (1997) also emphasizes how the will to limit political integration has been incidental to the creation of NAFTA.

As in Alesina and Spolaore (2003, p.116), *"a country is defined as an independent political unit in which (1) defence is completely and credibly centralized, (2) a unified government takes decisions over bargaining and war strategies, and (3) the net returns from conflict are distributed across its citizens"*. While retaining an independent national security policy, countries can decide to create a RTA with a partner, thus benefiting from a larger domestic market, i.e. an area free of barriers to trade. As usual in the literature on political integration, entering a RTA entails heterogeneity costs k, "*due to the necessity of keeping together individuals with different interests, preferences, culture, and history*" (Alesina et al., 1995). Indeed, economic integration implies common policies and the provision of some public goods at the regional level, which move away actual policies from individual ideal/preferences in each country.

Because, at the supranational level, no institution holds the monopoly of legitimate violence and can properly enforce property rights, countries face appropriation possibilities on a part R of their income ($0 < R < Y_i$). Disputes over income distribution are resolved either peacefully or through war according to the conflict game outcome. A dispute occurs worldwide with probability ρ and is located uniformly between any pair of neighboring countries, so that each of them undergoes a dispute with probability $\frac{\rho}{4}$. So, a country cannot engage in two wars.

The model is a 3-stages game: (1) countries first decide whether or not to form RTAs, (2) then they choose their defence spending, and finally (3) uncertainty about dispute location and escalation probabilities are revealed and conflicts are resolved. This timing appears relevant because forming a RTA takes time and is meant to last a long time; building defence capabilities is also a medium term process, but is less time consuming; and disputes occur and are resolved in the short term. The model has no time dimension. It is solved by backward induction.

The government of each country i chooses whether or not to form a RTA and the amount of resources devoted to defence spending d_i ($0 \leq d_i \leq Y_i$)[10] to maximize national utility, defined by:

$$U_i = Y_i - \phi_{ij}\ k_{ij} + \sum_{j \neq i} \mathbb{R}_{ij} - d_i \quad \forall i, j \tag{1}$$

where Y_i is national income, ϕ_{ij} is a dummy variable which equals 1 if countries i and j form a RTA, and $\mathbb{R}_{ij}$ is the expected net return from conflict.[11]

In order to keep the model tractable, the world is assumed to be divided into four countries distributed out of two continents, East and West (see figure 1). The cost of

[10] For simplicity, I assume that the constraint $d_i \leq Y_i$ is never binding in equilibrium.

[11] Each country is considered as a unified agent. We thus abstract from any non-unitary actor issue. Considering how the form of government could affect its decisions could be an interesting extension of the model.

forming a RTA between Eastern and Western countries is assumed to be prohibitive, because of wide differences in national preferences. One RTA can thus be created on each continent. On the other hand, each country shares a border with two other countries and can thus undergo international conflicts with each of them.

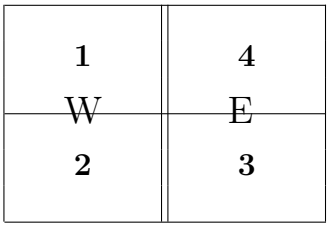


Figure 1: A 4 countries / 2 continents world

2 War and peace: the conflict game

The conflict game is based on a rationalist explanation of war, i.e. war occurs because some factors make state leaders unable to reach *ex ante* a mutually advantageous arrangement on conflict issues. Indeed, as far as destructions are involved, the use of armed force to resolve disputes is a second best outcome and is always Pareto dominated by a negotiated settlement. The question is then to understand what prevents leaders to find and/or implement a bargaining solution. Fearon (1995) argues that only three arguments fit a rationalist definition of war: asymmetries of information on resolve or military capabilities with incentives to misrepresent them, commitment problems, and issue indivisibility. The model of conflict below, adapted from Alesina and Spolaore (2005), relies on the second argument: wars occur because state leaders are unable to credibly commit to hold their position.

Consider two countries i and j evolving in an anarchic world, i.e. where no supranational institution or third party can enforce law. A part R $(0 < R < Y_i)$ of their national income is potentially subject to appropriation activities. It is worth noting that any conflict issues affecting national utility could be at stake, either on resource, rent sharing or ideology. A dispute may be settled through bargaining or through war. If both countries choose to fight, the distribution of payoffs depends on the relative military strength of opponents and each country undergoes war costs. A traditional ratio contest success function defines how the valuable pie $2R$ is distributed in case of military fight (Hirschleifer, 1988). When both countries choose the fighting strategy, payoffs are the followings:

$$\begin{aligned} \mathbb{R}_i^{ff} &= 2R\frac{d_i}{d_i + d_j} - C_{ij} \\ \mathbb{R}_j^{ff} &= 2R\frac{d_j}{d_i + d_j} - C_{ji} \end{aligned} \tag{2}$$

where d_i (d_j) is country i's (j's) military spending and C_{ij} stands for war costs.[12] War costs are symmetric, i.e. $C_{ij} = C_{ji}$ (see below).

When both countries choose to bargain, the pie subject to appropriation $2R$ is distributed according to the Nash bargaining solution. As in Alesina and Spolaore (2005), the war outcome is chosen as disagreement point, i.e. country i receives a fraction $b_{ij} = \frac{d_i}{d_i+d_j}$ of the valuable pie $2R$ when the dispute is settled peacefully.[13]

As far as war is costly, the war outcome is always Pareto dominated by the bargaining outcome. In absence of any other specification, the dominant strategy is (bargain, bargain). But as Grossman (2004a) outlines, a peaceful negotiated settlement is credible only if none has incentives to deviate, i.e. each opponent is left better off with the status quo than if he starts a war. In this respect, if a military advantage of attacking exists, and if that advantage exceeds the cost of war, none can credibly commit not to deviate. This first striker advantage, denoted E_{ij}, could materialize through a higher probability of winning or smaller war damages. It is assumed that E_{ij} is the same for the two opponents and that the country choosing to bargain when its opponent attacks undergoes a mirroring cost E_{ji} of equal magnitude ($E_{ji} = E_{ij}$). Strategy sets and outcomes are summarized in table 1.

Table 1: Conflict game outcomes

		Ctry j: Bargain	Ctry j: Fight
Ctry i	Bargain	$(2R\frac{d_i}{d_i+d_j}\ ;\ 2R\frac{d_j}{d_i+d_j})$	$\left(2R\frac{d_i}{d_i+d_j} - C_{ij} - E_{ji}\ ;\ 2R\frac{d_j}{d_i+d_j} - C_{ji} + E_{ij}\right)$
	Fight	$\left(2R\frac{d_i}{d_i+d_j} - C_{ij} + E_{ij}\ ;\ 2R\frac{d_j}{d_i+d_j} - C_{ji} - E_{ji}\right)$	$\left(2R\frac{d_i}{d_i+d_j} - C_{ij}\ ;\ 2R\frac{d_j}{d_i+d_j} - C_{ji}\right)$

So in a situation where the first striker advantage is sufficiently large, i.e. if $E_{ij} > C_{ij}$, the Pareto-optimal strategy, where both countries choose to bargain, is not a Nash-equilibrium. Given the opponent strategy, a country has incentives to deviate and strike first. In this case, it is straightforward to show that the only Nash equilibrium is (fight, fight). Otherwise ($E_{ij} \leq C_{ij}$), both (bargain, bargain) and (fight, fight) profiles are Nash

[12] $\frac{d_i}{d_i+d_j}$ can be understood either as the probability of victory or as the proportion of the pie country i won in the event of war, when states are risk neutral. The former interpretation is privileged here.

[13] We have: $b_{ij} = max\left(2R\ b_{ij} - 2R\frac{d_i}{d_i+d_j} + C_{ij}\right)\left(2R\ (1-b_{ij}) - 2R\frac{d_j}{d_i+d_j} + C_{ji}\right)$ s.t. $2R\ b_{ij} \geq 2R\frac{d_i}{d_i+d_j} - C_{ij}$, $2R\ (1-b_{ij}) \geq 2R\frac{d_j}{d_i+d_j} - C_{ji}$.

equilibriums.

Using refinements introduced by Bernheim et al. (1987) on coalition of players[14], a unique coalition-proof Nash equilibrium emerges in each situation: depending on the level of the first striker advantage E_{ij} relative to the cost of war C_{ij}, a unique coalition-proof Nash-equilibrium exists; the strategy profile outcome is (bargain, bargain) if $E_{ij} \leq C_{ij}$, and (fight, fight) if $E_{ij} > C_{ij}$.

The width of the first striker advantage is determined by factors such as military technology and capabilities, geography, economic and political situations, or the availability of information on opponent's strength. Here, I assume E_{ij} to be a random variable, fully revealed after decisions on defence spending have been made. In fact, when choosing their defence capabilities, countries do not know the location of disputes and the incentives to unilaterally deviate from the bargaining solution in specific conflicts. When defence are built, the location and first striker advantage are revealed to all actors, which seems plausible since building military capabilities requires time, so that decisions on military spending take place without full information on future conflicts. Then, we can derive a probability of dispute escalation to war, noted $\pi_{ij} = \Pr(E_{ij} > C_{ij})$. A dispute ends up in war with probability π_{ij} and is settled peacefully with probability $1 - \pi_{ij}$.

The expected net return from conflict between two countries i and j can now be computed. It depends on the probability of dispute occurrence ρ, the probability of dispute escalation to war π_{ij} and the revenue subject to appropriation R as follows:

$$\mathbb{R}_{ij} = \frac{\rho}{4}\left[\left(2R\frac{d_i}{d_i + d_j} - \pi_{ij}C_{ij}\right) - R\right] \tag{3}$$

3 Trade, income, and regional integration

Alesina et al. (2000) show that per capita income and growth rate are positively related to country size and openness to trade, and negatively related to country size multiplied by openness, i.e. smaller countries benefit more from trade openness than larger countries. Their argument is that larger countries enjoy a larger market size free of barriers to trade, which is more beneficial when trading with the rest of the world is difficult, i.e. when the global regime of trade is less free. This argument is just as much relevant concerning regional trade integration. Indeed, creating a RTA enlarges the domestic market to the aggregate size of all member countries.

National income is modeled in a pure exchange economy. It is positively related to the ability of a country to trade, either inside its domestic or regional market or with the rest of the world. Trade entails costs related to geographical, technological or political

[14]It states that if a coalition of player can reach higher payoffs in a given Nash equilibrium compared to others, this equilibrium will prevail. Separately, each player should still not have incentives to deviate.

obstacles. Trade costs are noted $\theta = (1-\tau)(1-\varphi)$, where $0 \leq \tau < 1$ represents physical barriers to trade and $0 \leq \varphi < 1$ political trade barriers (tariffs, harmonization of rules and standards...). θ is exogenous ($\theta = 1$ means global free trade). When a RTA is created, trade inside the regional market does not bear the latter costs ($\varphi^{\text{RTA}} = 0$). Countries are assumed to trade with themselves. Hence, national income is defined by:

$$Y_i = \varphi(1-\tau)S_i + (1-\tau)(1-\varphi)S_W \tag{4}$$

where S_W is the aggregate size of country's i trading partners, including itself, and S_i is the size of its domestic market. Country size is normalized to 1, so that $S_W = 4$ when peace prevails, and $S_i = 1 + \phi_{ij}$. In this setting, trade is mutually beneficial. Since globalization reduces transport costs, national income increases with globalization (larger θ).[15]

4 Equilibria

In line with empirical evidence of a large and persistent effect of war on bilateral trade (Glick and Taylor, 2005; Martin et al., 2008), war is assumed to disrupt trade with opponent.[16] War thus reduces national income Y_i because the country loses one trading partner. From equation (4), it follows:

$$C_{ij} = \begin{cases} (1-\tau) & \text{if countries } i \text{ and } j \text{ belong to the same RTA} \\ (1-\tau)(1-\varphi) & \text{otherwise} \end{cases} \tag{5}$$

The opportunity cost of war is thus larger inside a RTA than between countries that are not members of the same agreement: $C_{ij}^{\text{ind}} < C_{ij}^{\text{RTA}}$. It follows from this result that the probability that a dispute ends up in war is smaller inside a RTA than outside a RTA. Noting $\pi^{\text{ind}} = \Pr(E_{ij} > C_{ij}^{\text{ind}})$ and $\pi^{\text{RTA}} = \Pr(E_{ij} > C_{ij}^{\text{RTA}})$, we have $\pi^{\text{ind}} > \pi^{\text{RTA}}$. A peaceful resolution of disputes is thus more likely when the opponents belong to the same RTA.

Equilibrium defence spending and gains from appropriative activities can now be derived for each configuration of RTAs. Country i's government chooses its level of defence spending to maximize the expected net return from conflict. We obtain:

$$d_i = \frac{R\rho}{4} \tag{6}$$

Proof in appendix A.

The net expected return from conflict is defined as the net gains from appropriative activities when a dispute occurs minus the appropriable income R. From equation (3), (5)

[15] Ruta (2005) shows that such a simple model of trade yields similar results than the model of trade in intermediate goods developed by Alesina et al. (2000).

[16] Without loss of generality, direct war costs, which are assumed to be symmetric, are ignored.

and (6), it equals for all countries j bordering country i:

$$\mathbb{R}_i = \sum_{j \neq i} \mathbb{R}_{ij} = \begin{cases} \frac{-\rho}{4}(1-\tau)\left[(1-\varphi)\pi^{\text{ind}} + \pi^{\text{RTA}}\right] & \text{if country } i \text{ belongs to a RTA} \\ \frac{-\rho}{2}\pi^{\text{ind}}(1-\tau)(1-\varphi) & \text{else} \end{cases} \tag{7}$$

Regional integration thus affects income through two channels: trade and appropriative activities. These gains from integration should exceed related heterogeneity costs. Conditions under which regional integration will take place can now be derived. A RTA will be created between country i and j ($\phi_{ij} = 1$) if they both strictly prefer regional integration to independence, i.e. $U_i^{\text{RTA}} > U_i^{ind}$ and $U_j^{\text{RTA}} > U_j^{ind}$.

Proposition 1 *For all $k_W < k_E$, we have in equilibrium:*

- *no RTA if and only if $EGRI \leq k_W$,*
- *one RTA on the Western continent if and only if $k_W < EGRI \leq k_E$,*
- *one RTA on each continent if and only if $EGRI < k_E$,*

where $EGRI$ is the "expected gains from regional integration" and

$$EGRI = \frac{\rho}{4}(1-\tau)\left[(\pi^{ind} - \pi^{RTA})(1-\varphi) - \pi^{RTA}\varphi\right] + (1-\tau)\varphi. \tag{8}$$

Proof in appendix A.

This proposition puts forward the intuitive result that equilibrium strategies of countries on each continent are to create RTAs when trade and conflict related gains from regional integration outweigh the heterogeneity costs. Since heterogeneity costs of integration are larger on the Eastern continent, when $k_W < EGRI \leq k_E$ regional integration takes place only among Western countries. When $EGRI < k_E$, a RTA is formed on each continent.

5 Expected gains from regional integration

The effect of the level of heterogeneity costs on incentives to create a RTA is clear-cut. How international insecurity, ρ, and global trade openness, τ and φ, impact $EGRI$ is less straightforward. Interestingly, the effect of an increase in international insecurity (higher ρ) will be contingent upon the pacifying effect of regional integration. When the gains from reduced escalation to war probability under RTAs ($(\pi^{\text{ind}} - \pi^{\text{RTA}})(1-\varphi)$) outweigh the potential losses due to the larger opportunity cost of war ($\varphi\pi^{\text{RTA}}$), an increase in international insecurity will increase gains from integration and thus, everything else equal, incentives to create a RTA. Otherwise, a more insecure world will decrease incentives to create a RTA.

Testable implication 1 *"Expected gains from regional integration" increase in international insecurity ($\frac{\partial EGRI}{\partial \rho} > 0$) if regional integration reduces significantly dispute escalation to war ($(\pi^{ind} - \pi^{RTA})(1-\varphi) > \varphi\pi^{RTA}$). Otherwise, the opposite is true ($\frac{\partial EGRI}{\partial \rho} < 0$).*

The intuition behind is that in a more insecure world, countries would create a RTA only if it favors the peaceful resolution of conflicts and offers a significant guarantee against the risk of trade disruption related to war. A country will accept to be more dependent on a partner only if the trade related gains from regional integration are not offset by the larger potential cost of war. To the extent that different RTAs have different effects on dispute escalation to war probabilities, dispute occurrence will affect differently incentives to create each kind of RTAs.

Globalization also has an ambiguous effect on incentives to regional integration. On the one hand, a decrease in political barriers to trade at the multilateral level (i.e. a lower φ), such as tariffs cut under WTO, unambiguously reduces "expected gains from regional integration". It is worth noting that such channel of globalization, by preventing the creation of RTAs, could increase the actual number of wars. Indeed, the probability that an international war actually occurs is endogenous to the model, as it depends on the configuration of the world. Let Ω be this probability; by definition we have:

$$\Omega = \frac{\rho}{2}\left[\phi_{ij}\pi^{\text{RTA}} + (2-\phi_{ij})\pi^{\text{ind}}\right] \tag{9}$$

In fact, a reduced level of global political barriers to trade $\varphi' < \varphi$, by preventing the formation of RTAs ($\phi'_{ij} = 0$) could lead to a higher probability of observing an actual war, $\Omega' > \Omega$.

On the other hand, globalization through a decrease in physical barriers to trade affects differently gains from regional integration. Again, if regional integration reduces significantly the probability of dispute escalation to war ($(\pi^{\text{ind}} - \pi^{\text{RTA}})(1-\varphi) > \varphi\pi^{\text{RTA}}$), then a decrease in physical barriers to trade unambiguously promotes regionalism, because it increases gains from integration arising both from trade and conflicts. Otherwise, the effect is lower or even negative, because conflict related gains from integration decrease in τ.

Testable implication 2 *Globalization through a decrease in physical barriers to trade (lower τ) increases more strongly "expected gains from regional integration" when regional integration reduces significantly the probability of dispute escalation to war ($(\pi^{ind} - \pi^{RTA})(1-\varphi) > \varphi\pi^{RTA}$).*

The theoretical model above puts forward that the expected gains from regional integration differ according to the pacifying effect of RTAs, i.e. the relative level of π^{ind} and π^{RTA}. This in turn depends on the distribution of E_{ij} and the value of political barriers

to trade φ. As underlined in section II, the trade creating effect of different RTAs is statistically similar (Vicard, 2007; Ghosh and Yamarik, 2004); φ would thus be similar for all RTAs. However, RTAs entailing the creation of a significant institutional framework, such as customs unions and common markets, are likely to favor the peaceful resolution of interstate conflicts and to reduce the likelihood of dispute escalation to war (Bearce, 2003; Bearce and Omori, 2005; Haftel, 2007). In the conflict game developed in this paper, this pacifying effect goes through a reduction of the first-striker advantage. Supranational institutions and regular meetings of high level officials indeed favor the exchange of information on military capabilities and resolve, and thus limit the opportunity for a surprise attack or increase the effectiveness of counter-attacks (Grossman, 2004b). So the institutional features of RTAs matter for the distribution of E_{ij}, thereby affecting the probability of dispute escalation to war π_{ij}. The definition of the "depth" of regional trade integration considered in section II relates the shape of economic integration and the design of the institutional framework created. More integrated RTAs, such as customs unions and common markets, require a significant regional institutional framework, only able to promote the peaceful resolution of disputes and to avoid the use of armed force to resolve conflicts, i.e. to limit the first-striker advantage ($E_{ij}^{\text{deep RTA}} < E_{ij}^{\text{shallow RTA}}$) and so to reduce further the probability of dispute escalation to war under RTA, $\pi_{ij}^{\text{deep RTA}} = \Pr(E_{ij}^{\text{deep RTA}} > C_{ij}^{\text{RTA}})$.

The effect of both trade openness and international insecurity on gains from creating a RTA are found to be contingent on the ability of RTAs to significantly prevent disputes to escalate into war. In this theoretical framework, RTAs may be differentiated according to their ability to regulate interstate relations, and the choice to form a RTA with a partner depends on the interplays between trade and security issues. Estimating determinants of RTA creation defined in proposition 1 thus requires a preliminary step. We need first to assess which kinds of RTAs actually reduce the likelihood of war occurrence, i.e. to distinguish between deep and shallow RTAs. Then, we will be able to test the implications 1 and 2 of the theoretical model, by estimating the probability of RTA formation on these two different samples of RTAs, that international insecurity ρ and trade globalization φ are expected to affect differently.

IV Econometrics

In this section, I test empirically implications (1) and (2) of the theoretical model, which suggest that the likelihood to create a RTA between two countries are:

- positively related to the propensity to interstate disputes concerning deep RTA;
- negatively related to the propensity to interstate disputes concerning shallow RTA;

- negatively related to the level of physical barriers to trade concerning deep RTA, but less so or even positively for shallow RTA.

Though, we need first to investigate the effect of different kinds of RTAs on the likelihood of war occurrence.

1 Data

Data on RTAs have been assembled from notifications to the WTO under article XXIV of GATT or the Enabling Clause for developing countries[17], Frankel (1997), Foroutan (1993, 1998), Langhammer and Hiemenz (1990), Machlup (1977) and other public sources. I consider all regional (i.e. three or more parties) trade agreements which take the form of Preferential Trade Arrangements (PA), Free Trade Areas (FTA), Customs Unions (CU), or Common markets (CM)[18], in force at least one year between 1950 and 2000. Non reciprocal agreements are thus excluded. Bilateral agreements are also considered separately for two reasons: their institutional framework is limited and likely to differ from regional agreements, and it is difficult to compute all bilateral agreements and especially their depth on a long time span as ours.[19] Reliable data are more comprehensively available for recent years, so that I also compute membership in bilateral RTAs for the year 2000 for robustness analysis. Unless otherwise mentioned in our sources, an agreement is assumed to be in force at the date defined in the treaty and, if not available, once the agreement has been signed and ratified. It should, however, be noted that this does not necessarily mean that all provisions of the agreement have been fully implemented. Membership in RTAs is defined by dummy variables coded 1 when both countries in the dyad are members of the same RTA during the year considered. Deep RTAs aggregates CM and CU; they are those involving a more complete political integration and the provision of public goods in common. Our data set reports 49 RTAs over the period 1950-2000, of which 17 are coded as PAs, 13 FTAs, 17 CUs and 2 CMs (see Appendix B1 for a detailed list).

The occurrence of a Militarized Interstate Dispute (MID) between two states is coded from the COW database (Faten et al., 2004) which reports all interstates disputes involving the use of armed force on a yearly basis since 1816. The COW project defines a war as a MID involving at least 1000 deaths of military personnel. This restrictive definition dramatically reduces the number of events considered as war, and prevents any robust

[17] http://www.wto.org/english/tratop_e/region_e/region_e.htm

[18] Based on WTO, a PA is defined as an agreement among three or more parties in which reciprocal preferences are exchanged to cover a limited range of the parties' trade in goods (partial in scope); a FTA is defined as an agreement among three or more parties in which reciprocal preferences are exchanged to cover a large spectrum of the parties' trade in goods; a CU is defined as a RTA with a common external tariff in addition to the exchange of trade preferences; and a CM is defined as a RTA allowing free movements of factors (goods, capital and workers).

[19] Exceptions are the inclusion of the CU between the EU and Malta, Cyprus and Turkey, and the CU between Slovakia and the Czech Republic, and the Closer Economic Relations agreement between Australia and New-Zealand.

empirical analysis. I follow the literature and use a broader definition of war including armed conflicts involving the display or the use of armed force, i.e. a MID of hostility level 3 (display of force), 4 (use of force) or 5 (war) in the COW database.[20]

The qualitative data provided by databases on armed conflicts, such as the COW database above, imply that the actors, the duration, the geographical location and the intensity of each conflict have been defined by researchers. Thus, only rare events such as wars can be considered. But to assess the dispute initiation process, we need to measure conflicts of lower intensity, not reported in such data sets. An alternative type of data is available: events data which account for a broader range of interstates relations. Events data are reported, by trained students or automatically by computers, on a day by day basis from newspapers or wire services and coded by actor, target, as well as action form and date. Data on daily events have the great advantage of providing information whatever the intensity of the underlying event. In comparison with armed conflict databases, if assessing the evolution of a given conflict is hardly feasible, such data enable to measure the occurrence of a dispute between two countries every year, which is what we need. Events data compiled by Kinsella and Russett (2002) are used to measure the occurrence of a dispute exceeding a certain threshold defined as *strong verbal hostility*.[21] They overlap data from three events databases, the Conflict and Peace Data Bank (COPDAB), the World Event/Interaction Survey (WEIS) and the Protocol for the Assessment of Nonviolent Direct Action (PANDA), to construct a dummy variable coded 1 if a dispute occurs for any dyad-year over the 1950-1992 period.[22] Table 2 provides event categories coded as disputes and their equivalent on the widely used Goldstein (1992) scale, which rates events between -10 and +10 according to the level of conflict or cooperation they embed. Only events classified at least as conflictual as categories "Cancel or postpone planned events" and "Charge; criticize; blame; disapprove" are coded as a dispute. Out of the 127259 dyad-years of our sample, 7884 experience a dispute, of which 584 spillover into MID.

Trade data come from the database assembled by Katherine Barbieri[23], who uses mostly information from the IMF and the League of Nations international trade statistics, and completed by Martin et al. (2008) using the IMF DOTS database. Income data also comes from Martin et al. (2008), and are assembled from the Penn World Table (version 6.2), Katherine Barbieri's database and the World Bank WDI database. Geographic and

[20] MIDs of hostility level 2 (threat to use force) are excluded. See the COW website (`http://www.correlatesofwar.org/`) for more information and records of MIDs.

[21] See Kinsella and Russett (2002, p.1054-1055) for more details on databases used and the operationalizing of the minimum conflict intensity threshold. Using disputes exceeding a certain intensity in our analysis limits the biases related to the use of event data (Schrodt and Gerner, 2000).

[22] 189 cases exhibit a MID but no dispute. I follow Kinsella and Russett (2002) and treat them as measurement errors, due to the fact that events data sets rely on major news media and do not cover accordingly all regions of the world. The dummy variable is thus recoded as if a dispute occurred.

[23] See `http://sitemason.vanderbilt.edu/site/k5vj7G/new_page_builder_4`

Table 2: Events and Goldstein scale

Event category	**Goldstein**
Request action; call for	-0,1
Explicit decline to comment	-0,1
Urge or suggest action or policy	-0,1
Comment on situation	-0,2
Deny an accusation	-0,9
Deny an attributed policy, action, role or position	-1,1
Grant asylum	-1,1
Make complaint (not formal)	-1,9
Cancel or postpone planned events	-2,2
Charge; criticize; blame; disapprove	-2,2
Issue formal complaint or protest	-2,4
Give warning	-3
Denounce; denigrate; abuse	-3,4
Halt negotiation	-3,8
Turn down proposal; reject protest, demand, threat	-4
Refuse; oppose; refuse to allow	-4
Reduce routine international activity; recall officials	-4,1
Detain or arrest person(s)	-4,4
Threat without specific negative sanction stated	-4,4
Issue order or command, insist, demand compliance	-4,9
Expel organization or group	-4,9
Order person or personnel out of country	-5
Nonmilitary demonstration, walk out on	-5,2
Reduce or cut off aid or assistance; act to punish/deprive	-5,6
Threat with specific negative nonmilitary sanction	-5,8
Ultimatum; threat with negative sanction and time limit	-6,9
Threat with force specified	-7
Break diplomatic relations	-7
Armed force mobilization, exercise, display; military buildup	-7,6
Noninjury destructive action	-8,3
Nonmilitary destruction/injury	-8,7
Seize position or possessions	-9,2
Military attack; clash; assault	-10

Source: Goldstein (1992)

colonial data are from the CEPII[24]. Tariff data are assembled by Gwartney et al. (2005) from World Bank (Various issues) and other sources[25]. Data on national material capabilities and formal defence alliances are taken from the COW project[26]. The composite democracy indicator is taken from Polity IV[27]. It measures openness/closedness of political institutions on a -10 / +10 scale (10 means high democracy). Finally, UN vote correlation is taken from "The Affinity of Nations: Similarity of State Voting Positions in the UN General Assembly" computed by Erik Gartzke.

2 The effect of regionalism on war

2.1 Econometric model

The preliminary step of this empirical analysis is to investigate the effect of the different kinds of RTAs on dispute resolution. As explicitly modeled in the theoretical section, the outbreak of a war results from a two-stage process, the initiation of a dispute and

[24] http://www.cepii.fr/anglaisgraph/bdd/distances.htm
[25] See http://www.freetheworld.com for details.
[26] http://www.correlatesofwar.org/
[27] http://www.cidcm.umd.edu/polity/

its escalation to war. A war cannot occur unless a dispute arises beforehand. The final observed outcome, i.e. the occurrence of a war between two countries i and j, actually has two components:

$$\Pr(war_{ij}) = \Pr(dispute_{ij}) \times \Pr(escalation_{ij} \mid dispute_{ij}) \tag{10}$$

The value of interest in this paper is the second component of the right-hand side equation, i.e. the probability of escalation to war when a dispute arises (π in the theoretical model). Using a simple probit or logit model to estimate the conditional probability of war would thus yield results subject to a selection bias, because it cannot account for dispute initiation. The probability of existence of a dispute between two countries (ρ in the theoretical model) have to be taken into account. Once a conflict emerges, it is likely that the process driving its evolution greatly differs from the one explaining its initiation. Different factors could therefore have different impacts depending on the stage of the conflict process. For instance, neighboring countries are likely to face more disputes and also to be more prone to escalate them to war, because sharing a common border makes the use of armed force easier. Using a wide definition of conflicts, including diplomatic and economic disputes, Kinsella and Russett (2002) show that determinants of conflict onset and escalation differ and that the effect of some of them are nonmonotonic on the whole range of the conflict process.

Moreover selection effects have to be modeled because the escalation process is observed only if a dispute occurred. Unobserved variables, such as commitment, resolve or willingness to take risks, could therefore affect differently the processes of escalation and initiation, or could be disclosed at different stages of the conflict process. As Fearon (1995) emphasizes, asymmetries of information are particularly relevant for explaining war occurrence. The state leaders enter disputes with few information on opponent's commitment or resolve. But this information is disclosed along the conflict process and could therefore influence the later stages. The degree of asymmetric information therefore differs according to the stage of the conflict process. And information disclosed when a dispute is initiated is likely to influence its escalation process.

Using a bivariate probit with censoring is thus a natural econometric model to estimate the probability of war for each dyad-year. It allows to jointly model the dispute initiation and its escalation to war and to account for the impact of each factor on different stages of the conflict process and of the censoring of the dependent variable. The log-likelihood function is based on the unconditional probabilities associated with the three possible outcomes (Greene, 2003, p.713): no dispute ($dispute = 0$), a dispute emerges but does not escalate to war ($dispute = 1$ and $war = 0$), and the dispute escalates into war ($dispute = 1$ and $war = 1$). Two equations are jointly estimated, one explaining the dispute initiation

and the second the dispute escalation to war. Consider y_1 and y_2, two latent (unobserved) variables, representing the difference in utility levels from dispute initiation and dispute escalation to war respectively. The model estimated is derived from a standard bivariate probit model:

$$\begin{aligned} y_1 &= \beta_1 X_1 + \epsilon_1 \quad \text{and } dispute = \begin{cases} 1 \text{ if } y_1 > 0 \\ 0 \text{ if } y_1 \leq 0 \end{cases} \\ y_2 &= \beta_2 X_2 + \epsilon_2 \quad \text{and } war = \begin{cases} 1 \text{ if } y_2 > 0 \\ 0 \text{ if } y_2 \leq 0 \end{cases} \end{aligned} \tag{11}$$

where $X_{1,2}$ are vectors of explanatory variables, $\beta_{1,2}$ vectors of parameters, and errors terms ϵ_1 and ϵ_2 are assumed to be independent from $X_{1,2}$ and to follow $E(\epsilon_1) = E(\epsilon_2) = 0$, $Var(\epsilon_1) = Var(\epsilon_2) = 1$, and $Cov[\epsilon_1,\ \epsilon_2] = \varrho$.

Wooldridge (2002, p.564) emphasizes that, technically, the coefficients can be identified due only to the nonlinearity of the two equations in the bivariate probit. Hence, it is not necessary for X_2 to be a strict subset of X_1 for the outcome equation to be identified. However, the identification of the parameters of the model is better handled when X_1 contains at least one variable that is not in X_2, so that we have an exclusion restriction, i.e. a variable that influences the selection equation but not the outcome equation. The number of landlocked countries in a dyad is a good candidate as an identification variable, because it reduces the likelihood for two countries to experience any interaction, and in particular disputes, but there is no reason to believe that being landlocked affect the way conflicts are settled, peacefully or through war.[28]

All specifications control for autocorrelation by clustering the bivariate censored probit at the dyadic level.

2.2 Econometric results

Studies of war have put forward various determinants of war, related to history, military technology, geography, and economic and political relations. A number of control variable are thus considered in the empirical analysis, in order to account for any variable affecting at the same time war occurrence and RTA membership. Geography is a major determinant of conflict occurrence, both onset or escalation, as well as of the choice of RTA partners (Baier and Bergstrand, 2004). The history of war has also been found to be an important determinant of current interstate relations (Beck et al., 1998) so, as is common in the literature, the number of peaceful years within the dyad is included. Three controls for trade relations are added: a proxy for bilateral trade interdependence (the log of the mean

[28] When introduced in a probit model of the second stage equation, the number of landlocked countries is not statistically significant.

of bilateral imports in percentage of GDP), and another for multilateral trade dependence (the log of the mean of multilateral (excluding bilateral) imports in percentage of GDP), as well as a dummy for dyad experiencing zero trade flows (both exports and imports), as a control for fixed trade costs. It allows to account for any impact of RTAs on the geography of trade, as it has been argued that bilateral trade reduces the likelihood of war whereas multilateral trade dampens this relation (Martin et al., 2008). In order to remove the potential contemporaneous effect of war on bilateral and multilateral trade, trade variables are lagged 4 years.[29] In addition, controls for cultural, historical and diplomatic affinities between countries are included. These are dummies for pairs of countries sharing a common language, ever in a colonial relationship or with a common colonizer, and the UN general assembly vote correlation (lagged 4 years). Countries sharing affinities are more likely to be part of the same RTA, to trade more and to be less warlike, whereas countries sharing common colonial history would exhibit more unresolved conflict issues. The sum of democracy indexes is also included in our specification because it has been shown that democracies are less likely to wage wars (see Levy and Razin (2004) and Jackson and Massimo (2007) for a theoretical treatment, and Oneal and Russett (1997) among others for empirical evidence), but it has also been argued that democracy affect the choice to create a RTA (Mansfield et al., 2002), so that its omission could bias our results. Moreover, a proxy for country size, - a bigger territory is more difficult to defend and is exposed to more opponents, but a big country is also less open to trade and is particular with respect to regional integration, as it often implies asymmetric integration -, and a dummy for countries sharing a common defence alliance are included. Finally, year dummies are added to control for any chock affecting all dyads in the same year. It is worth noting that when all these controls are added, the Wald test of independent equation is no longer significant so that the two equation simultaneously estimated are independent.[30]

Results are presented in table 3. They show that the institutional variation in RTAs matter concerning their effects on the way interstates conflicts are settled. Joint membership in a customs union or a common market promotes the peaceful resolution of disputes whereas membership in other RTAs does not affect the dispute escalation to war process *per se*. This effect is sizeable. Figure 2 plots the conditional (on selection) predicted probability of war ($\Pr(war = 1|dispute = 1)$) for different values of some key determinants of

[29] Martin et al. (2008) show that a 4-years lag is enough to remove any contemporaneous reverse effect of war on trade. RTA membership is obviously not affected by any contemporaneous effect of military conflict, because it takes time to negotiate and implement an agreement. Using panel fixed effect or instrumental variable econometric models to control for endogeneity potentially arising from omitted variables likely to affect simultaneously war and RTA membership is not possible here because too few dyads enter both war and RTA over our time period and exogenous determinants of RTA membership are not available.

[30] It is however not the case when only basic determinants of war are included. See Vicard (2008) for additional robustness analysis.

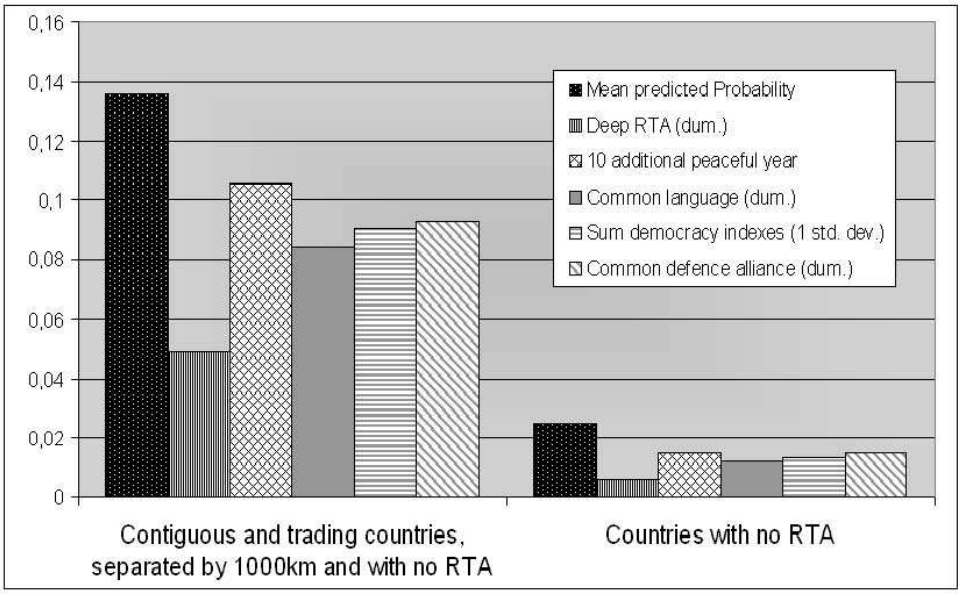
Table 3: Impact of RTAs on war: bivariate censored probit model

Equation:	Escalation	Initiation
Dependent variable:	MID	Dispute
Deep RTA membership	-0.57[b]	0.10
	(0.28)	(0.10)
FTA membership	0.25	-0.24
	(0.28)	(0.15)
PA membership	-0.01	-0.00
	(0.14)	(0.07)
Nbr. of peaceful years	-0.01[a]	-0.00[a]
	(0.00)	(0.00)
Log distance	-0.06	-0.32[a]
	(0.11)	(0.02)
Contiguity dum.	0.56[a]	0.30[a]
	(0.18)	(0.07)
Bil. trade dependence (t-4)	0.38	1.68[a]
	(0.57)	(0.23)
Multil. trade dependence (t-4)	0.21[c]	-0.30[a]
	(0.12)	(0.05)
Zero trade dum. (t-4)	0.09	-0.21[a]
	(0.18)	(0.03)
Common language dum.	-0.29[a]	0.16[a]
	(0.10)	(0.04)
Colonial relationship dum.	-0.19	0.54[a]
	(0.23)	(0.09)
Common colonizer dum.	0.07	0.10[c]
	(0.13)	(0.06)
Sum of democracy indexes	-0.41[a]	0.23[a]
	(0.08)	(0.03)
Common defence alliance dum.	-0.31	0.47[a]
	(0.19)	(0.06)
Log area	-0.01	0.12[a]
	(0.05)	(0.01)
UN vote correlation (t-4)	0.30	-0.99[a]
	(0.35)	(0.05)
Nbr. Of landlocked dum.		-0.22[a]
		(0.03)
Observations	127259	
Uncensored Obs.	7884	
Log likelihood	-23308.5	
Rho (Wald test of independent eqn.)	-0.26	

Note: Robust standard errors adjusted for intragroup correlation in parentheses. a, b and c respectively denote significance at the 1%, 5% and 10% levels. Intercept and time dummies not reported.

war (unless otherwise mentioned, variables are held at their mean). Joint membership in a deep RTA reduces the predicted probability that a dispute escalate into war by almost two third.[31] This peace externality is also sizeable in comparison with the effect of other determinants of war. It is equivalent to increasing the number of peaceful years between two countries by 28 years from its mean value; and it is twice larger than the effect of sharing a common language or a common defense alliance, or increasing the sum of democracy indexes by one standard deviation from the mean.

Figure 2: Conditional (on selection) predicted probabilities



These results confirm that only the institutional framework provided by deep RTAs significantly reduces the likelihood that a dispute escalate into war. Two categories of agreements can thus be distinguished according to their ability to prevent dispute escalation to war: deep RTAs (customs unions and common markets) provide significant security externality whereas shallow agreements (preferential agreements and free trade agreements) do not.

3 The formation of Regional Trade Agreements

Having defined the different categories of RTAs, their determinants can now be investigated. Proposition 1 relates the formation of RTAs to international insecurity, physical and political barriers to trade, and the heterogeneity costs of integration, i.e. geographical as well as cultural proximity of countries. Based on the theoretical model, I estimate the

[31] It reduces the predicted probabilities that a dispute escalate into war by 8,8 percentage points (1,9 percentage points) for contiguous and trading countries separated by 1000km and not member of any RTA (resp. countries not member of any RTA), from a baseline predicted probability of 13.6% (2,5%).

probability of RTA formation between two countries i and j at time t using a probit model:

$$Pr(RTA_{ijt} = 1) = \beta_0 + \beta_1\ \rho_{ijt} + \beta_2\ \tau_{ijt} + \beta_3\ Controls_{ijt} + \epsilon_{ijt} \tag{12}$$

Equation 12 is estimated separately for deep and shallow RTAs. From, implications (1) and (2), we expect $\beta_1 > 0$ for deep RTAs and $\beta_1 < 0$ for shallow RTAs, and $\beta_2 > 0$ for deep RTAs and $\beta_2^{shallow} < \beta_2^{deep}$.

Events data described above are used to compute a proxy for dispute propensity. The interstate dispute variable is defined as the dispute propensity between countries i and j over a 10 years period, lagged nine years to both prevent any simultaneity bias and take into account the time needed to negotiate an agreement. Physical barriers to trade are approximated by the average of multilateral trade (exports plus imports minus bilateral trade flows) as a share of GDP, as a proxy for the natural trade openness related to countries' market access.

As Baier and Bergstrand (2004) underline, endogeneity should be considered in our modeling strategy, because past RTA membership could impact the current economic fundamentals of members. To deal with this endogeneity issue, two strategies are implemented.

- Concerning the proxy for dispute propensity, I estimate an IV probit model, where dispute occurrence is determined endogenously, thanks to the use of exogenous instrumental variables.[32] Theory in international relations gives us exogenous instrumental variables: the ratio of national material capabilities (i.e. the ratio of the lower to the higher capability index) and the major power status of countries in the dyad are highly correlated to dispute occurrence but not directly related to RTA membership. The former indicator is compiled by the COW project from six indicators: military expenditure, military personnel, energy consumption, iron and steel production, urban population, and total population. It is commonly used in political science to assess the relative national military capabilities.[33]

- Multilateral trade openness is also likely to be affected by past RTA membership. However, no appropriate instrumental variables are available, because standard geographical determinants of trade openness also affect RTA formation. So the variable measuring the natural openness of countries is lagged in 1960 to remote any effect of past RTA membership on current openness. The inclusion of year dummies controls for any global reduction of physical barriers to trade over time and any variation in

[32] Another advantage of using an IV econometric model is that it also deals with measurement error of the endogenous explanatory variable, which is, as explained above, also valuable in our case. For instance, institutions under deep RTAs are likely to publicize disputes, creating a downward bias on the coefficient of dispute propensity in the deep regionalism case.

[33] More information is available from COW website: http://www.correlatesofwar.org/

global tariffs. Likewise, all variables including the GDPs (similarity of income per capita, average GDPs and difference of GDPs) are also lagged in 1960. This reduces the sample of countries, because several countries were not independent in 1960.

The probability of RTA between two countries is estimated every five years between 1980 and 2000. Because the traditional Sargan test is not applicable in our econometric specification, a Smith-Blundell test (with the probexog program) and a Wald test of exogeneity are implemented to test for the exogeneity of our model and the relevance of our two stages IV probit econometric specification. Both strongly confirm the need to account for endogeneity (first stage estimates are provided in appendix C).

3.1 Results

Results are reported in table 4. It first presents results including only controls directly derived from proposition 1 of the theoretical model. Heterogeneity costs are related to geographical, cultural and historical proximity; it is approximated first by the distance between the most populated cities of the two countries and common border for its geographic part, and income level similarity (the log of the difference of income per capita) and dummies for common language and common colonizer for its cultural and historical part. Finally, year dummies are included to control for any overall co-evolution over time of RTA membership, interstate disputes and national trade openness, and in particular for the variation of global political impediments to trade.

For the sake of completeness, specifications (1) and (2) report the results of simple probit estimations for, respectively, pooled RTAs and when deep and shallow RTAs are differentiated. Specification (3) presents estimation results when dispute propensity is instrumented in order to account for endogeneity. Dispute propensity is then found to be significantly and strongly negatively associated to shallow RTAs and positively to deep RTAs, in accordance with our theoretical model. Countries experiencing lots of interstate disputes will agree to enter a RTA, and thus accept greater dependence on a given trading partner, only if it also creates institutions reducing the risks of trade disruption and securing the gains from trade. On the other hand, shallow agreements are created between countries whose trade relationship is not threatened by interstate conflicts. Comparison with specification (2), in which the dispute propensity variable is not instrumented, points out that endogeneity biases the estimated coefficient downward for both shallow and deep RTAs. The coefficients are nevertheless significant and exhibit the expected sign in this specification.

In addition, the level of physical barriers to trade also has a different effect according to the kind of RTA created. Countries naturally more open to trade are more likely to create deep RTAs, whereas the opposite is true concerning shallow RTAs. Pairs of countries more

integrated to the world trading system, i.e. facing less physical impediments to trade, have the incentive to create RTAs involving a large institutional framework. This result is a continuation, at the international level, of what North (1990, p.34) put forward regarding domestic institutions and exchange: *"the greater the specialization and the number and variability of valuable attributes, the more weight must be put on reliable institutions that allow individuals to engage in complex contracting with a minimum of uncertainty about whether the terms of the contract can be realized"*. By providing a broad supranational institutional framework, deep regionalism allows member countries to be more dependent on international trade. On the other hand, remote countries, which face more barriers to trade and are naturally less integrated to the world trading system, tend to form shallow RTAs.

Table 4: Probability of a RTA between two countries

Model:	Probit (1)	Probit (2)		IV Probit (3)		IV Probit (4)	
Dependent variable:	all RTAs	Shallow RTAs	Deep RTAs	Shallow RTAs	Deep RTAs	Shallow RTAs	Deep RTAs
Propensity to dispute	-0.30^b	-0.57^a	0.81^a	-3.33^a	3.15^a	-5.46^a	2.95^a
	(0.15)	(0.18)	(0.29)	(0.33)	(0.44)	(0.35)	(0.90)
Multi. trade (1960)	-0.10	-0.26^a	1.04^a	-0.52^a	1.33^a	-0.29^a	1.50^a
	(0.09)	(0.09)	(0.22)	(0.09)	(0.20)	(0.08)	(0.29)
Log distance	-0.33^a	-0.08^c	-1.27^a	-0.16^a	-1.07^a	-0.03	-0.95^a
	(0.04)	(0.04)	(0.08)	(0.04)	(0.09)	(0.04)	(0.11)
Contiguity dum.	0.64^a	0.74^a	-0.25	1.15^a	-0.60^a	1.40^a	-0.34
	(0.15)	(0.16)	(0.24)	(0.18)	(0.23)	(0.20)	(0.26)
Diff. GDP per capita (1960)	-0.19^a	-0.20^a	-0.02	-0.12^a	-0.05	-0.07^a	-0.10^c
	(0.02)	(0.02)	(0.05)	(0.02)	(0.04)	(0.02)	(0.06)
Common language dum.	0.04	0.22^b	-0.72^a	0.30^a	-0.72^a	0.15^c	-0.70^a
	(0.09)	(0.09)	(0.21)	(0.08)	(0.19)	(0.08)	(0.20)
Common colonizer dum.	-0.28^b	-0.17	0.02	-0.19	0.11	0.29^b	1.47^a
	(0.14)	(0.15)	(0.26)	(0.14)	(0.26)	(0.14)	(0.33)
Multi. tariffs						-0.08^a	-0.13^a
						(0.01)	(0.02)
Avg. GDP (1960)						0.48^a	-0.19
						(0.04)	(0.13)
Diff. GDP (1960)						-0.18^a	0.14^c
						(0.03)	(0.08)
Sum of democracy indexes						-0.43^a	2.36^a
						(0.06)	(0.33)
Common defence alliance dum.						0.85^a	0.49^a
						(0.10)	(0.18)
Observations	13262	13262	13262	13262	13262	11698	11698
Log pseudolikelihood	-4106.4	-3764.4	-658.3	2959.2	6018.0	3136.8	5736.0
Wald test of exogeneity	-	-	-	54.0^a	28.2^a	56.2^a	7.2^a
Smith-Blundell test of exogeneity	-	-	-	118.0^a	77.4^a	152.0^a	19.1^a

Note: Robust standard errors adjusted for intragroup correlation in parentheses. a, b and c respectively denote significance at the 1%, 5% and 10% levels. Time dummies and intercept are not reported.

In specification (4), I add a number of control variables, likely to affect at the same time RTA membership, dispute propensity and trade openness. I first include a proxy for global tariffs, the most visible political barriers to trade, measured by the average tariffs level for a sample of 28 countries[34]. It is exogenous to the dyad, so it is not affected by past RTA membership. I then control for the economic size of partner countries, by including the average GDP of countries in the dyad and the absolute difference in GDPs. While gains from economic integration are likely to be driven by the size of the partner's market, extensive empirical evidence suggest size determines national openness to trade. Finally, a proxy for the level of democracy and a dummy variable for countries sharing a common defence alliance are added. Some empirical evidences show that more democratic countries are more likely to create RTAs (Mansfield et al., 2002). On the other side, democratic status is also likely to affect dispute occurrence. Its omission could thus bias results. In addition, it is likely that citizens from democratic countries share common preferences, which reduces heterogeneity costs of political integration.

Control variables globally exhibit the expected sign. Any form of regionalism is deterred by heterogeneity among countries. More distant countries, as well as countries whose income level is dissimilar, are significantly less likely to form any RTAs, whereas adjacency increases the likelihood of creation of shallow RTAs. Geographic proximity therefore seems to be captured by distance for deep RTAs, and by the common border dummy for shallow RTAs. Sharing a common colonizer or a common defence alliance also promotes all kinds of regional integration. Sharing a common official primary language favors the creation of shallow RTAs, but it is surprisingly negatively related to the probability to form a deep RTAs. Regarding the democratic status, dyads exhibiting on average more democratic institutions have a higher probability to form a deep RTA, whereas shallow RTAs are less likely in democratic dyads. Disentangling different forms of regionalism is thus particularly important to understand how domestic institutions affect the formation of such international agreements. This result seems logical in the sense that entering a deep RTA involves to share some common supranational institutions or public goods. To give up such a part of the national sovereignty is possible only between similar countries in terms of political system, type of government and origin of the legitimacy. This constraint is less binding concerning shallow RTAs, in which more autocratic regimes can retain more independent power while benefiting from gains from trade. The average multilateral tariff level is negatively related to both deep and shallow RTA formation, but more strongly with the former. Interestingly, the size distribution of partner countries seems to drive differently shallow and deep RTAs. The larger and the more similar countries are, the

[34] Argentina, Australia, Austria, Belgium, Canada, Chile, Denmark, Finland, France, Germany, Greece, Hong Kong, Indonesia, Ireland, Italy, Japan, Luxembourg, Malaysia, Netherlands, New Zealand, Norway, Philippines, Spain, Sweden, Switzerland, Thailand, United Kingdom, and United States.

larger the likelihood to create a shallow RTA, which suggest that their formation is driven by market access. On the contrary, the economic size of countries does not affect the formation of deep RTAs, but dissimilarity in income foster deep regionalism. It suggests again that deep regionalism is motivated by regulation of interstate relations, which is particularly relevant concerning dissimilar countries.

Controlling for these additional determinants of the formation of RTAs does not alter the main results. In this complete (and preferred) specification, the results strongly, and significantly at the 1% level, confirm the theoretical predictions: countries more subject to interstate disputes and naturally more opened to trade create deep RTAs, whereas the opposite is true concerning shallow RTAs.

3.2 Robustness analysis

In order to check the robustness of the results, I estimate several alternative specifications of the model. First, to test for any sample bias due to the presence of the EU member countries, which belong to Western Europe, an historically particularly integrated region, the preferred specification (4) is re-estimated on a restricted sample, excluding Western European country pairs. Results are presented in the first columns of table 5. Our main results remain qualitatively unchanged. In the deep RTA case, the significance of the coefficient on dispute propensity is however reduced, which arises because excluding Western European country pairs largely reduces the number of dyads member of a deep RTAs. Hence, our results are robust to the exclusion of Western Europe, the historically and geographically most integrated region of the world.

The sample is then restricted to the year 2000. This specification is thus closer to the model estimated by Baier and Bergstrand (2004), focusing on cross-country variation in RTA membership. The time variation in RTA membership is not accounted for, and the evolution of global tariffs is hence not included in the model. The instrumented variable, dispute propensity, is computed over the whole period. Specification (6) in table 5 presents the results. Overall, results are consistent with previous findings. Dispute propensity again affects strongly and negatively shallow regionalism but positively deep regionalism, with coefficients significant at the 1% level. However, lagged trade openness is found to strongly foster the formation of deep as well as shallow RTAs. In this specification, lagged trade openness is a proxy for both natural openness to trade and the degree of liberalization of the world trade system. As in preceding specifications, this effect is however stronger for deep than for shallow regionalism. Coefficients on other control variables remains qualitatively similar.

Finally, the definition of RTAs used so far could induce a selection bias, because it restricts the sample of agreements included in the dependent variable. Specification (6) is re-estimated using a wider definition of trade agreements, including all bilateral trade

agreements (see appendix B for a list of bilateral agreements included). The inclusion of this variable was impossible before because, according to the initial definition of RTAs adopted in this paper, no such country pairs entered a regional agreement. Results, provided in specification (7) in table 5, confirm previous findings. Results are thus robust to alternative definition of the dependent variable, such as a wider definition of trade agreements adopted in specification (7).

Table 5: Probability of a RTA between two countries (IV Probit)

Model:	Western European dyads excluded (5)		Year 2000 (6)		Year 2000 and bil. RTAs (7)	
Dependent variable:	Shallow RTAs	Deep RTAs	Shallow RTAs	Deep RTAs	Shallow RTAs	Deep RTAs
Propensity to dispute	-5.58^a	2.01^c	-10.05^a	4.61^a	-7.48^a	4.61^a
	(0.34)	(1.18)	(0.63)	(1.34)	(0.73)	(1.34)
Multi. Trade (1960)	0.48^a	0.59^c	0.29^a	0.75^a	0.79^a	0.75^a
	(0.04)	(0.33)	(0.08)	(0.22)	(0.04)	(0.22)
Multi. Tariffs	-0.05^a	-0.13^a				
	(0.01)	(0.02)				
ln distance	-0.07	-0.59^a	0.06	-0.93^a	-0.41^a	-0.93^a
	(0.06)	(0.11)	(0.05)	(0.09)	(0.04)	(0.09)
Contiguity dum.	1.51^a	0.07	1.31^a	-0.16	0.75^a	-0.16
	(0.23)	(0.38)	(0.21)	(0.26)	(0.20)	(0.26)
Diff. GDP per capita (1960)	-0.08^a	0.01	-0.15^a	0.08	-0.21^a	0.08
	(0.02)	(0.07)	(0.02)	(0.05)	(0.02)	(0.05)
Common language dum.	0.16^b	-0.51^b	0.24^a	-0.49^a	-0.00	-0.49^a
	(0.08)	(0.23)	(0.08)	(0.19)	(0.09)	(0.19)
Common colonizer dum.	0.27^b	1.30^a	0.09	2.05^a	-0.20	2.05^a
	(0.13)	(0.27)	(0.13)	(0.28)	(0.15)	(0.28)
Avg. GDP (1960)	-0.17^a	-0.24^b	0.59^a	-0.20^c	-0.32^a	-0.20^c
	(0.03)	(0.12)	(0.04)	(0.11)	(0.03)	(0.11)
Diff. GDP (1960)	-0.25^a	0.03	-0.20^a	0.02	0.58^a	0.02
	(0.08)	(0.07)	(0.02)	(0.06)	(0.08)	(0.06)
Sum of democracy indexes	-0.30^a	1.84^a	-0.43^a	2.14^a	-0.14^b	2.14^a
	(0.05)	(0.31)	(0.07)	(0.31)	(0.07)	(0.31)
Common defence alliance dum.	0.82^a	0.59^a	0.74^a	0.43^a	0.50^a	0.43^a
	(0.12)	(0.22)	(0.11)	(0.16)	(0.10)	(0.16)
Observations	11200	11200	3347	3347	3347	3347
Log pseudolikelihood	3098.7	5875.9	2631.1	3580.2	2312.0	3580.2
Wald test of exogeneity	60.7^a	4.1^b	72.7^a	9.9^a	55.0^a	9.9^a
Smith-Blundell test of exogeneity	152.0^a	19.1^a	81.3^a	7.8^a	61.0^a	7.8^a

Note: Robust standard errors adjusted for intragroup correlation in parentheses. a, b and c respectively denote significance at the 1%, 5% and 10% levels. Intercept not reported.

V Conclusion

This paper is the first to investigate, both theoretically and empirically, why RTAs take different forms around the world. By introducing simultaneously military and trade issues in a model of political integration, this paper sheds light on the interplays between security and economic forces in the formation of RTAs. It puts forward that defining the depth of regional integration in relation with the level of political integration it entails is necessary to understand the determinants of the shapes of regionalism. Results emphasize that different kinds of RTAs have different determinants. Countries more subject to interstate disputes and naturally more opened to trade are more likely to create politically integrated regional agreements, such as common markets or customs unions. On the contrary, international insecurity deters the formation of less integrated agreements implying a weak institutional framework, such as preferential or free trade agreements. Besides their potential effect on trade, analyzing RTAs as regulating institutions in a world where no supranational institution enforces property rights is therefore particularly relevant. In order to remain sustainable, a greater national openness to trade, and thus a greater dependence on trading partners, requires guarantees on the continuity of access to world markets, i.e. that interstates conflicts would not lead to the disruption of economic flows. Such regulation is typically the purpose of institutions such as those created under the more integrated RTAs.

These results have important implications concerning the nexus between multilateralism and regionalism. Indeed, the positive security externality of deep RTAs highlighted in this paper suggests that institutions created along with regional integration are a prerequisite to market integration, which could doubtfully be provided at the multilateral level. Regionalism and multilateralism would therefore be complementary as far as the former encourages countries to put less emphasis on matters of security and to be more dependent on international trade.

Appendix A: Proofs

Defence spending:

Each country chooses its level of defence spending while taking into account defence spending of its potential opponents, its neighbors. Thus, without RTAs, the Nash equilibrium defence spending are:

$$d_1^* = \max_{d_1} \left\{ \frac{\rho}{4} \left[2R\frac{d_1}{d_1 + d_2^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) + 2R\frac{d_1}{d_1 + d_4^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_1 \right\}$$
$$d_2^* = \max_{d_2} \left\{ \frac{\rho}{4} \left[2R\frac{d_2}{d_2 + d_1^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) + 2R\frac{d_2}{d_2 + d_3^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_2 \right\}$$
$$d_3^* = \max_{d_3} \left\{ \frac{\rho}{4} \left[2R\frac{d_3}{d_3 + d_2^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) + 2R\frac{d_3}{d_3 + d_4^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_3 \right\}$$
$$d_4^* = \max_{d_4} \left\{ \frac{\rho}{4} \left[2R\frac{d_4}{d_4 + d_1^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) + 2R\frac{d_4}{d_4 + d_3^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_4 \right\}$$

whose first order conditions give:

$$\frac{d_2}{(d_1+d_2)^2} + \frac{d_4}{(d_1+d_4)^2} = \frac{d_1}{(d_2+d_1)^2} + \frac{d_3}{(d_2+d_3)^2} =$$
$$\frac{d_4}{(d_3+d_4)^2} + \frac{d_2}{(d_3+d_2)^2} = \frac{d_1}{(d_4+d_1)^2} + \frac{d_3}{(d_4+d_3)^2} = \frac{2}{\rho R}$$

The solution is:

$$d_1^* = d_2^* = d_3^* = d_4^* = \frac{\rho R}{4}$$

With one RTA[35], the Nash equilibrium defence spending are defined by:

$$d_1^* = \max_{d_1} \left\{ \frac{\rho}{4} \left[2R\frac{d_1}{d_1 + d_2^*} - \pi^{\text{RTA}}(1-\tau) + 2R\frac{d_1}{d_1 + d_4^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_1 \right\}$$
$$d_2^* = \max_{d_2} \left\{ \frac{\rho}{4} \left[2R\frac{d_2}{d_2 + d_1^*} - \pi^{\text{RTA}}(1-\tau) + 2R\frac{d_2}{d_2 + d_3^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_2 \right\}$$
$$d_3^* = \max_{d_3} \left\{ \frac{\rho}{4} \left[2R\frac{d_3}{d_3 + d_2^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) + 2R\frac{d_3}{d_3 + d_4^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_3 \right\}$$
$$d_4^* = \max_{d_4} \left\{ \frac{\rho}{4} \left[2R\frac{d_4}{d_4 + d_3^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) + 2R\frac{d_4}{d_4 + d_1^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_4 \right\}$$

The solution is:

$$d_1^* = d_2^* = d_3^* = d_4^* = \frac{\rho R}{4}$$

[35] I assume $k_W < k_E$; the Western continent is then the first to create a RTA.

Finally, with two RTAs, the Nash equilibrium defence spending are defined by:

$$d_1^* = \max_{d_1} \left\{ \frac{\rho}{4} \left[2R\frac{d_1}{d_1 + d_2^*} - \pi^{\text{RTA}}(1-\tau) + 2R\frac{d_1}{d_1 + d_4^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_1 \right\}$$
$$d_2^* = \max_{d_2} \left\{ \frac{\rho}{4} \left[2R\frac{d_2}{d_2 + d_1^*} - \pi^{\text{RTA}}(1-\tau) + 2R\frac{d_2}{d_2 + d_3^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_2 \right\}$$
$$d_3^* = \max_{d_3} \left\{ \frac{\rho}{4} \left[2R\frac{d_3}{d_3 + d_4^*} - \pi^{\text{RTA}}(1-\tau) + 2R\frac{d_3}{d_3 + d_2^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_3 \right\}$$
$$d_4^* = \max_{d_4} \left\{ \frac{\rho}{4} \left[2R\frac{d_4}{d_4 + d_3^*} - \pi^{\text{RTA}}(1-\tau) + 2R\frac{d_4}{d_4 + d_1^*} - \pi^{\text{ind}}(1-\tau)(1-\varphi) - R \right] - d_4 \right\}$$

The solution is again:

$$d_1^* = d_2^* = d_3^* = d_4^* = \frac{\rho R}{4}$$

The decision to form a RTA:
Regional integration is strictly preferred to independence if $U^{\text{RTA}} > U^{ind}$. From equation 1, we know that gains from regional integration arise from 3 sources: market size, conflict and relative defence spending. Those "expected gains from regional integration" ($EGRI$) should outweigh the heterogeneity costs from integration k_i, such that:

$$EGRI > k_i \text{ where } EGRI = (Y_i^{\text{RTA}} - Y_i^{ind}) + (\mathbb{R}_i^{\text{RTA}} - \mathbb{R}_i^{ind}) - (d_i^{\text{RTA}} - d_i^{ind})$$

Substituting together with equation equation (4), (6) and (7), the "expected gains from regional integration" equal:

$$EGRI = \frac{\rho}{4}(1-\tau)\left[(\pi^{\text{ind}} - \pi^{\text{RTA}})(1-\varphi) - \pi^{\text{RTA}}\varphi\right] + (1-\tau)\varphi$$

Appendix B: Regional Trade Agreements

Common Markets		Political agreements	
Benelux	1961	European Coal and Steel Community	1952-1957
European Union (EU)	1992	Regional Cooperation for Development	1965-1979
		Arab Maghreb Union	1989
Custom Unions		South African Development Coordination Conference	1980-1999
Benelux	1947-1960	Cross Border Initiative 26	1990
European Communities	1958-1991	Association of South East Asian Nations	1967
Equatorial Customs Union	1959-1965	South Asian Association for Regional Co-operation	1985
Custom Union of West African States	1960-1966		
East African Community	1967-1977	Asian Pacific Cooperation (APEC)	1989
Custom Union EU-Malta	1971		
Custom Union EU-Cyprus	1973	**Bilateral Free Trade Agreements**	
Mano River Union	1973		
Caribbean Community and Common Market (CARICOM)	1973	EU-Norway	1973
		EU -Switzerland	1973
Southern Common Market (MERCOSUR)	1991	EU -Egypt	1977
Custom Union Czech Republic-Slovakia	1993	United States of America -Israel	1985
Central American Common Market	1993	EU -Czech Republic	1992
Economic and Monetary Community of Central Africa	1994	EU -Hungary	1992
		EU -Poland	1992
Andean Custom Union	1995	EFTA -Czech Republic	1992
Custom Union EU-Turkey	1996	EFTA -Turkey	1992
Eurasian Economic Community	1997	EU -Romania	1993
West African Economic and Monetary Union	1998	EFTA -Bulgaria	1993
		EFTA -Hungary	1993
Free Trade Agreements		EFTA -Israel	1993
		EFTA -Poland	1993
European Free Trade Agreement (EFTA)	1960	EFTA -Romania	1993
Central American Common Market	1961-1975	EU -Bulgaria	1994
Caribbean Free Trade Area	1968-1972	Mexico -Bolivia	1995
Papua New Guinea and Australia Trade and Commercial Relation Agreement	1977	Mexico -Costa Rica	1995
		MERCOSUR -Chile	1996
Closer Trade Relations Trade Agreement	1983	MERCOSUR -Bolivia	1996
Central European Free Trade Agreement	1993	India -Nepal	1996
Andean Free Trade Area	1993	Canada -Chile	1997
European Economic Area	1994	Canada -Israel	1997
Baltic Free Trade Area	1994	Czech Republic -Israel	1997
North American Free Trade Agreement	1994	Israel -Turkey	1997
Commonwealth of Independent States	1995	Poland -Israel	1998
Group of Three	1995	CARICOM -Dominican Republic	1998
South African Development Community	2000	Czech Republic -Turkey	1998
		EU -Tunisia	1998
Preferential Arrangements		Hungary -Israel	1998
		Hungary -Turkey	1998
Council for Mutual Economic Assistance	1949-1990	Mexico -Nicaragua	1998
Latin American Free Trade Association	1961-1980	Romania -Turkey	1998
Tripartite Agreement	1968	India -Sri Lanka	1998
Protocol relating to Trade Negotiations among Developing Countries	1973	Bulgaria -Turkey	1999
		Chile -Mexico	1999
West African Economic Community	1973-1997	EFTA -Morocco	1999
Bangkok Agreement	1976	EU -Israel	2000
South Pacific Regional Trade and Economic Cooperation Agreement	1981	EU -Morocco	2000
		EU-Mexico	2000
Gulf Cooperation Council	1984	EU -South Africa	2000
Andean Community	1988-1997	Mexico -Israel	2000
General System of Trade Preferences among Developing Countries	1989	Poland -Turkey	2000
Economic Cooperation Organization	1992	**Bilateral Preferential Arrangements**	
ASEAN Free Trade Agreement	1992		
Melanesian Spearhead Group	1993	CARICOM-Venezuela	1993
Latin American Integration Association	1993	Chile-Bolivia	1993
Common Market for Eastern and Southern Africa	1994	Chile-Venezuela	1993
		Chile-Colombia	1994
South Asian Preferential Trade Agreement	1995	CARICOM-Colombia	1995
East African Cooperation	2000	Chile-Peru	1998

Source: WTO (http://www.wto.org/english/tratop_e/region_e/region_e.htm), Foroutan (1993, 1998), Langhammer and Hiemenz (1990), Frankel (1997), Machlup (1977) and other public sources.

Appendix C: First stage regressions

Table 6: First stage estimates

Dependent variable:	Propensity to dispute	
Second stage dependent variable:	deep RTAs	shallow RTAs
Major power dum.	0.28[a]	0.28[a]
	(0.01)	(0.01)
Ratio of military capabilities	0.04[a]	0.02[b]
	(0.01)	(0.01)
Multi. Trade (1960)	-0.05[a]	-0.05[a]
	(0.01)	(0.01)
Multi. Tariffs	-0.00	-0.00
	(0.00)	(0.00)
ln distance	-0.03[a]	-0.03[a]
	(0.00)	(0.00)
Contiguity dum.	0.17[a]	0.17[a]
	(0.03)	(0.03)
Diff. GDP per capita (1960)	0.01[a]	0.01[a]
	(0.00)	(0.00)
Common language dum.	0.04[a]	0.04[a]
	(0.01)	(0.01)
Common colonizer dum.	-0.01	-0.01
	(0.02)	(0.02)
Observations	12449	12449

Note: Robust standard errors adjusted for intragroup correlation in parentheses. a, b and c respectively denote significance at the 1%, 5% and 10% levels. Time dummies are not reported.

References

Alesina, A., Perotti, R., Spolaore, E., 1995. Together or separately? issues on the costs and benefits of political and fiscal unions. European Economic Review 39, 751–758. 7

Alesina, A., Spolaore, E., 2003. The Size of Nations. MIT Press, Cambridge MA. 2, 7

Alesina, A., Spolaore, E., 2005. War, peace, and the size of countries. Journal of Public Economics 89, 1333–1354. 6, 8, 9

Alesina, A., Spolaore, E., 2006. International conflict, defense spending and the size of countries. European Economic Review. 2

Alesina, A., Spolaore, E., Wacziarg, R., 2000. Economic integration and political disintegration. American Economic Review 90 (December), 1276–1296. 2, 6, 10, 11

Alesina, A., Wacziarg, R., 1999. Is europe going too far? Carnegie-Rochester Conference Series on Public Policy (supplement of Journal of Monetary Economics) 51, 1–42. 5

Anderson, J. E., van Wincoop, E., 2004. Trade costs. Journal of Economic Literature XLII, 691–751. 5

Bagwell, K., Staiger, R., 2002. The Economics of the World Trading System. The MIT Press. 3

Baier, S. L., Bergstrand, J. H., 2004. Economic determinants of free trade agreements. Journal of International Economics 64 (1), 29–64. 19, 23, 27

Balassa, B., 1961. Towards a theory of economic integration. Kyklos 16, 1–17. 1

Barbieri, K., 2002. The liberal illusion: does trade promotes peace? Ann Arbor: University of Michigan Press. 2

Bearce, D. H., 2003. Grasping the commercial institutional peace. International Studies Quarterly 47 (3), 347–370. 2, 4, 14

Bearce, D. H., Omori, S., 2005. How do commercial insttitutions promote peace? Journal of Peace Research 42 (6), 659–678. 2, 5, 14

Beck, N., Katz, J., Tucker, R., 1998. Taking time seriously: time-series-cross-section analysis with binary dependent variable. American Journal of Political Science 42 (4), 1260–1288. 19

Bernheim, B. D., Peleg, B., D, W. M., 1987. Coalition-proof nash equilibri: Concepts. Journal of Economic Theory 42 (1), 1–12. 10

Best, E., 2005. Surpranational institutions and regional integration, mimeo. 6

Bouzas, R., Soltz, H., 2000. Institutions and regional integration: the case of mercosur, mimeo (http://www.netamericas.net/Researchpapers/Documents/Bouzas/Bouzas1.pdf). 6

Faten, G., Palmer, G., Bremer, S., 2004. The mid3 data set, 19932001: Procedures, coding rules, and description. Conflict Management and Peace Science 21, 133–154. 15

Fearon, J. D., 1995. Rationalist explanations for war. International Organization 49 (3), 379–414. 4, 8, 18

Foroutan, F., 1993. Regional integration in sub-saharan africa: Past experience and future prospects. In: de Melo, J., Panagariya, A. (Eds.), New Dimensions in Regional Integration. Cambridge University Press, Cambridge. 15, 32

Foroutan, F., 1998. Does membership in an fta make a country more or less protectionist? The World Economy 21 (3), 305–335. 15, 32

Frankel, J. A., 1997. Regional Trading Blocs. Institute for International Economics, Washington. 15, 32

Ghosh, S., Yamarik, S., 2004. Does trade creation mesure up? a reexamination of the effects of regional trading arrangements. Economics Letters 82, 213–219. 1, 14

Glick, R., Taylor, A. M., 2005. Collateral damage: Trade disruption and the economic impact of war, nBER Working Paper 11565. 1, 4, 11

Goldstein, J. S., 1992. A conflict-cooperation scale for weis international events data. Journal of Conflict Resolution 36 (2), 369–385. 16, 17

Greene, W., 2003. Econometric Analysis. New York: Prentice Hall. 18

Grossman, H., 2004a. Choosing between peace and war, the Timbergen Lecture Series, n.19, University of Saskatchewan. 4, 9

Grossman, H. I., Jul. 2004b. Peace and war in territorial disputes. NBER Working Papers 10601, National Bureau of Economic Research, Inc. 4, 5, 14

Gwartney, J. D., Lawson, R., Gartzke, E., 2005. Economic freedom of the world: 2005 annual report. Tech. rep., The Fraser Institute. 17

Haftel, Y. Z., 2007. Designing for peace: Regional integration arrangements, institutional variation, and militarized inter-state disputes. International Organization 61 (1), 217–237. 2, 5, 14

Hirschleifer, J., 1988. The analytics of continuing conflicts. Synthese 76, 201–233. 8

Jackson, M. O., Massimo, M., 2007. Political bias and war. American Economic Review-Forthcoming. 4, 5, 20

Kinsella, D., Russett, B., 2002. Conflict emergence and escalation int interactive international dyads. The Journal of Politics 64 (4), 1045–1068. 16, 18

Langhammer, R. J., Hiemenz, U., 1990. Regional integration among developing countries. Westview Press: JCB Mohr. 15, 32

Levy, G., Razin, R., 2004. It takes two: an explanation for the democratic peace. Journal of the European Economic Association 2 (1), 1–29. 4, 20

Machlup, F., 1977. A History of thought on economic integration. London: Macmillan, Chap.5. 15, 32

Maggi, G., Rodriguez-Clare, A., 1998. The value of trade agreements in the presence of political pressures. Journal of Political Economy 106, 574601. 3

Mansfield, E. D., Milner, H. V., Rosendorff, B. P., 2002. Why democracies cooperate more: Electoral control and international trade agreements. International Organization 56 (3), 477–513. 20, 26

Martin, P., Mayer, T., Thoenig, M., 2008. Make trade not war? Review of Economic StudiesForthcoming. 1, 2, 4, 11, 16, 20

Mitra, D., 2002. Endogenous political organization and the value of trade agreements. Journal of International Economics 57 (2), 473–485. 3

North, D., 1990. Institutions, Institutional Change and Economic Performance. Cambridge MA: Cambridge University Press. 25

Oneal, J. R., Russett, B. M., 1997. The classical liberals were rigth: democracy, interdependence and conflict, 1950-1985. International Studies Quarterly 41 (2), 267–294. 2, 20

Oneal, J. R., Russett, B. M., 1999. Assessing the liberal peace with alternative specifications: trade still reduce conflicts. Journal of Peace Research 36 (4), 423–442. 2

Ornelas, E., December 2005. Endogenous free trade agreements and the multilateral trading system. Journal of International Economics 67 (2), 471–497. 3

Pomfret, R., 1997. The Economics of Regional Trading Arrangements. Oxford University Press. 6

Ruta, M., 2005. Economic theories of political (dis)integration. Journal of Economic Surveys 19 (1), 1–21. 11

Schrodt, P. A., Gerner, D. J., 2000. Analyzing international events data: a handbook of computer-based techniques, university of Kansas, On-line Manuscript, http://www.ku.edu/~keds/papers.dir/automated.html. 16

Vicard, V., 2007. On trade creation and regional trade agreements: Does depth matter?, university Paris I Pantheon-Sorbonne, mimeo. 1, 14

Vicard, V., 2008. War and regional trade agreements, mimeo, University Paris 1 Panthon-Sorbonne. 20

Wooldridge, J. M., 2002. Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: MIT Press. 19

World Bank, 2000. Trade Blocs. Policy Research Report, Washington DC. 1, 3

World Bank, Various issues. World Development Indicators. World Bank, Washington DC. 17